Long Beach Issues Form Response

1. ***Provide one or two examples of what contributes to effective <u>preparation</u> to the occurrence of tropical cyclones, floods, drought, or other natural disasters, include practices, activities, procedures, conditions, mechanisms, tools, interactions, relationships, etc.***

RA-I

- Best way to deal with attendant problems is with effective early warning and preparedness.
- Designated centers (NMHS's and Drought and Cyclone Monitoring Centers) prepare and disseminate warnings to the relevant authorities to enable them to take appropriate action to protect life and property. (Drought Monitoring Center/Nairobi-DMC))

- Advance information and knowledge.
- Adequate facilities. (Tanzania)

RA-II

- During June-August 1998, Yangtze River basin in China witnessed severe flooding that aroused the concerns all over the world. The Chinese weather forecasters made, by and large, accurate forecasts on short, medium, and long ranges, and provided governments at various levels with the weather forecast service in a timely and positive manner. In early April 1998, National Climate Center predicted that the middle and lower reaches of the Yangtze River and southern Yangtze River basin could suffer from heavy precipitation in early summer, and severe floods could happen in parts of the said areas. Moreover, during the critical moment of the flooding season, National Meteorological Center and relevant provincial meteorological forecasting offices made tendency forecast on severe precipitation process 7-10 days in advance. In the meantime, the 24-48 hours short-term weather forecasts were also rather accurate in terms of the intensity and scope of the precipitation.
  (ChinaMeteorological Administration(CMA)).

- *Long range forecast of Indian Monsoon rainfall*
- *Recent cyclones over the Bay of Bengal (-Indian Meteorological Department)*

RA-III

- An efficient public information and public awareness policy, aimed at the general public, the media and other governmental organizations.
- The establishment of sound working arrangements with other relevant organizations. (Argentina)

- Timely forecast information and warnings.
- Adequate language to disseminate information. (IDEAM Columbia)

- Personal contact with the various governmental authorities, especially with the regional civil protection agencies (Defensa civil) and the media (Venezuela)

RA-IV

- To have an institutional emergency plan, identifying clearly hierarchic levels, flow of information, decision-making process and direct actors (participants). For example: the Met Service issues a warning to the National Emergency Commission. It activates the local commissions(municipal and local levels) and this activates the local population. The National Emergency Commission provides feedback to the Met Service and the cycle continues. (Costa Rica)

- Providing the seasonal meteorological information and short, medium and long range forecast for decision makers, press and general public. (Hondouras)

- Yearly updating of the official emergency plan before the rainy season and potential critical periods.
- Periodic surveys of river beds and their solid sediments (in coastal plains) (El Salvador)

- Need to have access to all the information used in the warning process.
- Need for greater and more timely access to weather and warning information.
- Need to find a way to work as partners in the delivery of critical warnings and forecasts.(National Institute of Seismology, Vulcanology, Meteorology and Hydrology- Guatamala)

- Active participation of representatives of NMHS's in routine meetings of National Disaster Committees in order to provide expert advice with respect to long term planning.
- Active participation of NMHS in operational meetings of National Disaster Committees in order to provide expert advice with respect to measures and actions to be taken on disaster threats (Netherlands Antilles)

- Without question, the best preparation is to regularly test procedures for different types of events. Through these exercises, gaps are identified. NMHS staff must have a complete knowledge of the key components and responsibilities and well developed Standard Operating Procedures (SOPS). These procedures must be readily available, updated, tested regularly and must clearly outline who is to be notified during an event with clear instructions as to required information and its format. (Atmospheric and Environment Service (AES)-Environment Canada)

- Preparedness for extreme events involves three activities that are common to all weather, water, and climate hazards. The activities include:
- Hazard Analyses: The first step in preparedness planning is outlining the potential hazards that can effect an area and defining their frequency and severity. The result will be a prioritized list of what events to be prepared for. National Meteorological and Hydrological Services (NMHS's) assist local decision makers by providing climatological information, frequency tables, storm surge modeling analyses, and riverine flood analyses.
    - Vulnerability Analyses: From the information provided above, emergency managers can define what populations are at risk, what areas will need to be evacuated, what types of shelters should be provided, what evacuation routes should be used, and what procedures should be established to move people and property from harms way.
    - Creation of Early Warning Systems: NMHS's work with emergency managers to ensure critical products and services exist to support timely and informed decisions making. This includes identifying:
        - Critical information needs of local decision makers' critical thresholds for action.
        - Methodologies for communicating and coordinating critical information with emergency managers
        - Public and technical user awareness and preparedness education activities.

Some examples include:

- Creation of hurricane strike probabilities by U.S. and Japan.
- Creation of the Advanced Hydrologic Prediction Service.
- Implementation of the Threats Assessment linking short-term climate with hazardous event preparation activities.
- Weather radio dissemination systems by U.S. and Canada.
- Warning Coordination activities in WMO Region 6.
- NOAA/FEMA emergency management courses
- Public awareness materials by USA and WMO Typhoon Committee. (National Oceanic and Atmospheric Administration- National Weather Service(NWS))

RA-V

- Provide information/warnings to the public through mass media continually, especially during emergency situations.
- Disseminate information/warning to all related constitutional agencies through existing telecommunication system.(MGA Indonesia)

The NMHS has developed strong links with provincial and municipal agencies who are normally first- responders during disasters. Insurers have established the Institute for Catastrophic Loss Reduction, which provides a forum for stakeholders to discuss how to better manage the risk of extreme events. (see http://www.ibc.ca/English/articles/nat_mit_strategy.htm).

Keeping in mind the old adage (converted to metric) that "Thirty grams of prevention is worth a kilogram of cure:"

- Communication with the public before a peril strikes, risk assessment and risk identification are cornerstones of loss prevention;
- Those who knowingly choose to assume greater risk must accept an increased degree of responsibility for their choice;
- Partnership is the best approach to resolving shared problems, particularly public safety concerns

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- Outreach, or public education is by far the most important tool. Weather centres can issue streams of meteorological information, but as long as the connection between the information and impacts are not made clear, the public will not be able to effectively use the information. Some examples of effective outreach include:
    - Partnerships with the media (i.e. our ongoing work with the Discovery Channel series, Storm Warning; close relationships with the local media and availability to go on air and discuss weather issues, including events occurring in other parts of North America);
    - Working with educators to have input into curricula to ensure that accurate meteorological information is being taught. We have put a lot of hurricane information on our web site, and something similar could be done with other severe weather phenomena.
    - SITS, Scientists in the Schools is vastly popular but the requests far outnumber our ability to respond. We get invitations to talk to school groups, Guides and Scouts etc. but can only respond sporadically. (Atmospheric Environmental Services (AES)-Environment Canada).

- To have a plan that includes the different actions that need to be carried out for the occurrence of those events.
- To improve the training level and knowledge about the natural disasters in the population by means of an educational process. (Nicaragua)

- Establishment of warning criteria.
- Establishment of key recipients of warnings.
- Fostering personal contact and confidence.(N. Zealand)

- *Preparation for the East Asian Winter Monsoon heavy rainfall and floods*.
- The preparation is carried out through the National Disaster Management Committee which coordinates all the early warning activities, disaster prevention and preparedness and relief and response activities at the national level.
- A coordination meeting is normally held two months before the onset of the monsoon with the aim of reviewing the seasonal weather forecast, the level of preparedness and the improvement required in the various components of the response system.
- The national coordination meeting is followed by the coordination meetings of all State Disaster Management Committees which focus on preparation at the state level.
- *Preparation for El Nino/ La Nina associated events.*
- Description of El Nino/La Nina and its impacts to the mass media including radio and television interviews.
- Hundreds of briefing sessions to government agencies and various concerned private sectors focusing on answering their queries.
- Establishing El Nino/La Nina website in the MMS homepage.
  (Malaysian Meteorological Service (MMS))

RA-VI

- Development and operation of flood warning system on provincial level. For example, Braden-Wurttemberg, combination of numerical weather prediction, rain gauges, radar information, and collaborative meteorology-hydrology-regional authorities.
- Participation in a national research project" German Research Network for Natural Disasters". (Deutscher Wetterdienst, Germany (DWD)

- Good accuracy of weather forecasts which mean, among others, density of observations, including meteorological satellites, NWP, skilled forecasters, etc.
- Strong relationships between meteorological services, search and rescue authorities, media . (Meteo France)

- Accurate forecasts of rainfall
- Efficient links with appropriate emergency services.
- Testing of procedures. (United Kingdom Meteorological Office (UKMO))

Media

- Many obstacles have been removed in recent years with the Internet. Even though at Univision I have access to a powerful weather graphics computer, I often rely on the Internet to gather weather information, warnings, and forecasts from the Caribbean and Latin America.
- Met services that have their own web sites greatly help in this manner.
- For tropical cyclones, for example, contributing to preparation for such events is all the NHC data and bulletins, reconnaissance flight data, model output, radar and satellite imagery, all available on the Internet. (Univision)

- Government establishes a network for detecting and warning of hazardous phenomena.
- Government supports research program for determining locations particularly at risk from hazardous phenomena.
- Government and other agencies disseminate the information about nature of the hazards and areas vulnerable. (The Weather Channel (TWC)).

- The most important thing in the media is, to secure a single reliable source of warning, with the best meteorological information. And this requires international coordination, because this is not only valid for international broadcasters but also for national ones – news are spread all over the world.
- To define the proper reception-mode (fax?) of warnings also proper and reliable Internet sources.
- For the media: Most weather occurrences return every season or every year – visual explanations of the occurrence could be ready (including text file) in a library for easy explanation.
- A proper in-house communication about weather-occurrences between different departments in-house should be prepared in advance (telephone-numbers, names of responsible people in house, in weather-services to verify occurrences)

  (International Association of Broadcast Meteorologists- IABM)

Organizations

- Timely and accurate forecasts.
- Land use zoning
- Education and information to the communities (IADB)

- Warnings conveyed in understandable language and by effective means to affected communities.
- Community preparedness to respond.(IDNDR)

- Timely and accurate forecasting and warning information.
- Acceptance by the public that 1) they're at risk. 2) Knowledge of, and confidence in, the steps that they can and should take to both prepare for and reduce the impacts of the approaching storm.
- Incentives (such as reduced property taxes and insurance policy premiums, and/or lower mortgage interest rates or decreased origination and other loan fees) for people who take the steps necessary to better protect their homes (e.g., installing permanent hurricane shutters, roofing clips and straps, bolting the frame of the home to the foundation, strengthening garage doors etc, etc,)
- Disincentives (such as higher property taxes and insurance premiums etc) for people who don't take steps to protect their homes)
- Data and success stories that document the benefits and cost-effectiveness of proactive disaster mitigation and preparedness efforts.
  (American Red Cross (ARC)

- Community based monitoring of rainfall, and river flow/elevation (Organization of American States(OAS).

- Knowledgeable partners among civic leaders, emergency managers, technical experts, Red Cross personnel, etc.

- Communication between partners must be frequent, forceful, and effective. (American Meteorological Society (AMS))

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Academia

- Emergency evacuation plans
- Public warning system. (National Hazards Research &Application Information Center (NHRAIC)

- Appropriate building codes and zoning and enforcement of such.
- Education and training of public.
- More reliable forecasts and warnings; e.g. more accurate in space and time, fewer false alarms.
  (University Corporation for Atmospheric Research-UCAR)

- Development of accurate geographical and demographic data bases to properly identify threats (Friday –National Research Council (NRC))

US Private Sector

- A "single voice" providing timely collection and dissemination of the information using all possible mechanisms (public and private) to

insure delivery of the information to the emergency management community and the public. The "voice" should be authoritative and decisive in nature, communicating a sense of control of the situation. (WSI)

- Proper planning, sharing of resources and use of information technology to link, communicate, organize, train are necessary elements. (Essential Technologies,Inc.)

- Early, timely notification of such events, or forecasts of such events, is crucial to preparation efforts. Such information needs to be made available from a wide variety of services, media, internet, etc. (DTN/Kavouras)

Other US Governmental Organizations

- (Most important) establish natural disaster reduction as a public value.
- Highlight individual responsibility for mitigation versus reliance on government-led response and recovery. To the focus on public safety, add attention to reducing business disruption.
- Make homes (hospitals/schools) a safe haven versus relying on evacuation as a first defense (in other words, reduce the need for evacuation to a bare minimum).
- Inter-annual/seasonal forecasts and long-range outlooks greatly contribute to public awareness and preparedness.

(Subcommittee on Natural Disaster Reduction(SNDR))

1a. Provide one or two examples of obstacles to effective <u>preparation</u> prior to the occurrence of tropical cyclones, floods, drought, or other natural disasters.

RA-I

- The biggest obstacle in our part of the world is poor communication with the communities likely to be effected by these phenomena.
- Inadequate explanation of the nature of the probable danger and its extent.
- People are often unwilling to take action on the basis of probabilities which they do not understand when this will likely disrupt the normal life.(DMC)

- Lack of information and knowledge.
- Lack of facilities. (Tanzania)

RA-II

- On 21 July 1998, a severe torrential rain of 286mm rainfall occurred in Wuhan, a city in the middle reaches of Yangtz River. Good forecast was made in terms of location and timing of the torrential rain, but the

forecasted intensity was obviously lower than the observed. In addition, the prediction on the location for the main rain belts of the flooding season in 1999 is not satisfactory. This shows that our capability to predict and forecast severe meteorological disasters (for instance, tropical cyclone, torrential rain and others) should be improved to meet the needs of flood control. It also indicates that we lack adequate understanding on the mechanism of occurrence and evolution of the severe extreme weather events and climate conditions.(CMA)

- Socio-economic constraints (India)

RA-III

- The lack of adequate contingency plans for collaboration with the other international organizations.
- The lack of previously coordinated information dissemination arrangements with the media, that is vital in order to reach the general public. (Argentina)

- Delay in forecast information.
- Different or several sources of warning information (Columbia)

- Lack of contact between the local meteorological and hydrological services. (Venezuela)

RA-IV

- Lack of knowledge (culture) about the phenomenon itself
- The press/media changes the meaning of the technical bulletins received.
- Lack of appropriate coverage to communicate with the population.
- Excessive and unnecessary concentration of power in middle and high levels, during emergencies (Costa Rica)

- Inclusion of non-qualified personnel (usually journalists, Internet users) in meteorological information broadcasting, which confuses the population.(Honduras)

- Private and government top officials – directly involved in natural hazards management caused confusion about the meteorological role in preparedness and response.
- Unfair competitiveness from commercial television before and during critical events.(El Salvador)

- Lack of agreement on the definition of warnings.
- Lack of agreement on roles each participant will play in the process.(Guatemala)

- Non participation in meetings of National Disaster Committees and thus allowing other, sometimes non-experts, to take over the field of expertise of NMHS's. (Netherlands Antilles)

- For preparation to be truly effective, all organizations involved in the warning and preparedness process must work together as a team. This partnership, called the Hazards Community, includes:
  - National agencies involved in weather, water, and climate issues.
  - Surrounding NMHSs.
  - National, state, and local emergency managers.
  - The media.
  - Non-government organizations (Red Cross and Red Crescent Societies).
  - Volunteer Groups (storm spotters).
  - Commercial weather service organizations.
  - Private sector companies with a stake in weather, water, and climate issues.

  Obstacles to preparation include:
  - No organization willing to take the lead to identify and build partnerships within the Hazards Community.
  - NMHS's that do not see their role in the warning process as including preparedness activities.
  - Other issues governments consider more important. This occurs in countries where shelter, food, security, and other issues transcend hazard awareness and preparedness.
  - Reluctance to coordinate warnings and critical information with other NMHS's.
  - Reluctance of NMHS's to share data and information across their borders.
  - NMHS's whose mission emphasis is on applied meteorological applications rather than safety of life and property from natural events.
  - Countries with a low frequency of extreme events. (US NWS)

Canada has taken a number of steps to reduce our vulnerability to human-made disasters through various policies and legislation (e.g. Transportation of Dangerous Goods Act) and dozens of other pieces of federal and provincial legislation). However, with the exception of building codes, we do not have similar legislation to improve our resilience to natural hazards. This situation could be improved upon.

Short memory and attention span of both authorities and citizens. Agencies tend to react to what is 'in their face' rather than doing real strategic planning in their program area. Large scale or cascading events do not happen all that frequently. Lack of preparation or the testing of contingencies leads to uncorrected weaknesses when an event occurs. You cannot do widespread severe weather preparedness when the signature is on the RADAR screen.

A more difficult challenge is to define the increasing risk over time due to rising sea levels and possible increased intensity of severe weather events in a changing climate. Translating the science to prove the wise investment of scarce financial resources is time consuming and difficult. For example, events like droughts are problematic in some regions. We have made tentative first steps through an Environmental Prediction workshop held two years ago. We brought together specialists from various areas to explore and discuss climate impacts on wildlife, and things like changing sea surface temperatures on sea bird nesting patterns; such fora are instrumental in communicating the increased risk and severity of, inter alia, drought in a changing climate. (AES)

Our current policy framework is focused on reactive solutions. Canadians have developed clear responsibilities and have a good track record for what occurs during and after a disaster, but we lag well behind other nations in terms of investments to prevent losses.

- "Power" interests, particularly in government bureaucracies, can be detrimental to developing effective contingency plans. Ideally each event requires clear authorities and "one" voice concerning the;
    - Alert or warning
    - Response plan
    - Communications strategy
    - Education and public awareness

Unfortunately, several orders of government, the varied responders which may include government agencies or volunteer groups makes this an onerous challenge to define and refine.

"It can't happen here or to me" syndrome. Public and administrative awareness of the risks and response measures. .Examples;

- Radio announcer who doesn't repeat the tornado watch / warning
- Contingency plans that do not take into consideration that disasters can happen on weekends (e.g. Saguenay Flood)
- Citizens who do not pay attention to warnings because they feel they are helpless to avoid or mitigate the threat.
- Municipalities who can not communicate to their citizens after an event because they rely on gridded power networks or on radio stations without back up or UPS power systems and so are off-air after a catastrophe (Barrie tornado)(AES)

- Economic resources (Nicaragua)

RA-V

- Limited observation, communication equipment and infrastructure.
- Limited resources and staff to provide the accurate and timely information/warning to the public.(Indonesia)

- No one agency or agencies have responsibility.
- No one cares.
- No one knows. (N.Zealand)

- In relationship to monsoonal flood, there is difficulty in providing precise forecasts requested by user agencies, for example, date of onset of the monsoon, intensity of monsoon and its exact impact, particularly relating to individual states.
- As regards the El Nino/La Nina events, the national meteorological service is unable to provide an adequate projection of the detailed evolution of El Nino/La Nina event and its impacts for at least a period of six months ahead. The main users are the water management agencies, agriculturists and policy and decision makers.(Malaysia)

RA-VI

- Problems of achieving the broad interdisciplinarity: social science-natural sciences; science-practical work; military-civil task sharing and influences.
- Competition of aid agencies. (DWD)

- Failure of satellite (Meteo France)

- Failure to test the current viability of emergency procedures.
- Lack of experience of the impact of an extreme event. (The 1987 storm in the UK had impacts of which we lacked previous experience) (UKMO)

Media

- In countries where there are no Internet services it is nearly impossible to get accurate and timely information on the air. (Univision)

- People do not know that they are at risk, either due to inadequate research on the climatology of the hazardous phenomenon or to poor communication of the risk.
- People do not know what to do to minimize their vulnerability or are too poor to take preventative action (TWC).

- No effective warning procedure from the official warning source.
- Media tends to believe more to the press agencies publications when it comes to „news“, instead of believing the professionals from the weather department. The result: there may not be adequate preparation for potential disasters from TV-coverage and warning. Example: Hurricane Jose in October 1999 approached leeward islands in the Caribbean. All islands in the path of the storm were under hurricane warnings, except for the French islands, which were just under hurricane watches because of different procedures between French met service and US-service. Difficult

to tell that to the viewers. (IABM)

Organizations

- Forecasters working independently of the uses of the information (i.e." supply-side" approach instead of "demand-driven" approach).
- Population is not aware of the risks.
- Lack of adequate financing mechanisms for early warning activities (IADB)

- Fatalism or unwarranted optimism of citizens.
- Failure of preparedness plans to involve or have real means to local communities. (IDNDR)

- Denial—"It won't happen to me." Or—The perception that "There is nothing I can do about it." Or—"If it happens, my insurance company, FEMA, my state, local government or voluntary relief organization will make me whole again."
- Lack of knowledge on what can and should be done to prepare for or lessen the impacts of the storm.
- Absence of prudent land-use policies and building codes that is commensurate with the level of risk in the potentially affected area.
- Lack of mitigation cost-effectiveness information. (ARC)

- Lack of understanding by local communities of the impact of land use changes in the relationship between atmospheric events and vulnerability of populations, economic and social infrastructure. (OAS)

- Fatalistic attitude among civic and religious leaders that natural disasters are acts of God; therefore, preparation is not only useless but unholy.
- Insistence on a totally vertical communication within each partner organization, as opposed to horizontal communication at many levels between partner organizations.(AMS).

Academia

- Lack of integrating public officials into warning system, e.g., tech-fix approach.
- Lack of training and exercises with local communities. (NHRAIC)

- Inadequate building codes zoning regulations.
- Disregard of public of forecasts and warnings.
- Over warning and false alarms caused by limitations in the science of forecasting and warning. (UCAR)

- Lack of effective coordination channels, e.g., communications between NMHS and government disaster management officials. (NRC)

US Private Sector

- Conflicting or missing information generated by the ineffective use of tools or the absence of supporting data is likely to create serious obstacles in preparing for natural disasters. (WSI)

- Not sharing information and resources in the most efficient and effective ways. (Essential Technologies, Inc.)

- Government policies which make it difficult or illegal to distribute information or forecasts not generated by the government. Policies that restrict access to, or charge money for, data and/or forecasts (warnings, etc).(DTN/Kavouras)

Other US Governmental Organizations

- Infrequency of extreme events: it is easier to prepare for frequently occurring hazards than to prepare for the exceptional event.
- Forecasting limitations (in an unusual sense). Experience shows that the greater our ability to forecast a hazard, on all time scales, the greater the public willingness to agree that effective preparation is both necessary and an individual responsibility. (SNDR)

2. ***Provide one or two examples of what contributes to effective response to the occurrence of tropical cyclones, floods, drought, or other natural disasters, include practices, activities, procedures, conditions, mechanisms, tools, interactions, relationships, etc.***

RA-I

- Effective public education is crucial to effective response to natural disasters.
- Use of the media (electronic and print) as well as public workshops, for a,etc is one way of imparting appropriate information to the public.(DMC)

- Resources.(Tanzania)

RA-II

- The Chinese government has a well-organized system, which includes regulations and laws, necessary arrangements for materials and fund in respect of natural disaster preparedness and rescue. For instance, with

respect to the emergency response to tropical cyclones, strict and standardized response procedures have been established. Whenever tropical cyclones that may have potential influence on the Chinese coastal areas enter into our responsible areas, meteorological authorities will issue tropical cyclones reports, warnings, emergent warnings, or top grade emergency warnings directly to the governments at various levels and to the general public via mass media.(CMA)

- Long range forecast of Indian Monsoon rainfall
- Recent cyclones over the Bay of Bengal (India)

RA-III

- The widest possible distribution of warnings and reports through the media, particularly the major radio and television networks.
- Cooperation and the exchange of data and products amongst the global, regional and national meteorological centers. (Argentina)

- Reduction of the vulnerability.
- Organization of the community. (Columbia)

- The bulletins of the US National Hurricane Center of Miami, in the case of tropical cyclones. (Venezuela)

RA-IV

- To have meteorological emergency plans totally known by the operational meteorologists and the National Emergency Commission. (Costa Rica)

- As we integrate as the technical organization within the national contingencies commission, we provide general meteorological information and special forecasts for emergency operations. (Honduras).

- Regional or sub regional standardized frequency and schedule to broadcast advisories, warnings and bulletins.
- Forecasting personnel with good knowledge of river basins topography, soil and human settlements, especially vulnerable zones.(El Salvador)

- Need to keep up with technological changes.
- Need to recognize that many NMHS's have limited resources and staff to provide technical assistance. (Guatemala)

- Provision of good quality and timely information, warnings and forecasts by NMHS's, to important users (disaster authorities, news media, general public and specific users)

- Availability of a good operating web-site by NMHS's. (Netherlands Antilles).

When good preparedness planning is in progress, the proper response occurs. In the hurricane warning program, orderly and effective evacuations are the rule. This has lead to a dramatic reduction in the loss of life. Well coordinated agency activities also has lead to rapid post event humanitarian response.

- During hurricane Floyd, over 1 million persons evacuated.
- During hurricane Elena, 1985, portions of the Florida Panhandle were evacuated twice. One time during the Labor Day weekend.
- FEMA, through its Federal Response Plan (FRP), coordinates all post event response activities to speed recovery efforts.

Successful response to hurricanes is attributed to:

- Interagency Coordinating Committee on Hurricanes (ICCOH) establishes priorities for updating SLOSH basins.
- ICCOH work aids in development of regional evacuation studies to maximize evacuation routes.
- NWS/FEMA Hurricane Liaison Team (HLT) deploys to National Hurricane Center (NHC) to brief the FEMA Director, FRP agencies, and State Emergency Management Directors on the evolving forecast situation.
- The HLT briefings allow FEMA and others, such as the Red Cross, to pre-position supplies and stage recovery efforts to speed post event response.
- NHC establishes a media pool near the operations center to feed international, national, and local media. This ensures a consistent delivery of critical information to the public.
- Local Weather Forecast Offices stay in contact with local emergency managers and the local media to provide local information to support response decisions and to ensure a consistent delivery of critical information.(US NWS)

Extreme events will invariably stretch any organization well past its critical load. An effective response allows for the organization to draw upon other program areas for backup support.

For example, during hurricanes the Canadian Hurricane Center cannot deal with all the media requests without staff from other divisions filling in to do background work.

Communication lines with other orders of government and the media must be constructed and tested during quiet times; the time to test a response procedure is not best held during the event!.

The media is the strongest tool you have for effective dissemination of information; the NMHS needs to nurture these relationships well in advance.

Overall sustained preventative action can strengthen our resilience to catastrophic losses keeping in mind that local and individual actions are the most effective means of reducing the loss of life and property due to extreme events.(AES)

Good reliable communication systems and strategies;

- between agencies
- with citizens
- with the non-affected world

which takes advantage of all partners (government, response agencies, volunteer networks, citizens (e.g. Ham radio operators)(AES)

- To improve the technology that allows an effective watch on the dangerous natural phenomena.
- Maps of risk. (Nicaragua)

RA-V

- Improving public education and awareness on how to respond to the occurrence of natural disasters.
- Increasing coordination and cooperation between the related sectors. (Indonesia)
- Ongoing monitoring, forecasting and communication during the event. (New Zealand).

- Early Warning of heavy rainfall and flood and its effective dissemination contribute to effective response through alerting agencies responsible for disaster relief and evacuation activities.

- The procedures for the dissemination of heavy rainfall and flood warnings as well as explanation of flood warning messages are reviewed and updated yearly to minimize any breakdown in the communication system and to synchronize the operations all agencies involved in relief activities.

- Because of the nature of tropical weather phenomena except for El Nino associated drought, effective response is usually hampered by short lead-time in warning, particularly in relation to the occurrence of events during late night and early morning, during which the majority of agencies responsible for responding to the natural disaster are least prepared to react to warning messages.

- Another obstacle is related to the accurate assessment of the area of impact. (Malaysia).

RA-VI

- Proper organizations structures, clear communication links and techniques and exercises to check the system.
- Simple structures.
- Proper information for public and media. (DWD)

- Comprehensive planning of process
- Confidence between NMS and officials (Meteo France).

- Good routine testing of emergency procedures.(E.g., for nuclear incidents) (UKMO)

Media

- After a weather emergency the job of the meteorologist winds down, but rivers may still be out of their banks, and some areas may be dangerous due to debris or power lines. Again, contributing to doing my job is the availability of information. A deterrent to getting timely information on the air is the lack of it.
- Met and government services should better utilize the tools available (radio and TV) to get the official word out. (Univision)

- People get warnings in time to respond.
- People understand what the conditions are likely to be at their location and how it will affect them- good physical understanding of the phenomenon.
- Economic conditions favorable to appropriate response.(TWC).

- Oder-flooding in 1997- Communication between the responsible news-department and the weather-department about the published rain-predictions for the Oder-valley.
- Live interviews in TV with broadcast-meteorologists to explain the weather-situation and the possible future developments with adequate graphics. (IABM)

Organizations

- Adequate institutional response capabilities.
- Coordination of forecasters and disaster preparedness community.(IADB)

- Knowledge that it can happen here, e.g., designation of vulnerable zones.
- Having an action response plan understood by the community.(IDNDR)

- Timely and accurate forecasting information and warnings.
- Credibility in the forecast
- Well thought out, tested (or exercised, and coordinated emergency response plans.

- Public's acceptance of risk
- Adequate transportation networks and prepositioned disaster relief supplies. (ARC)

- Community based monitoring of rainfall and river flow/elevation with corresponding technical information to take precautionary action with or without regional or national level input. (OAS)

- Prompt and timely reaction by relief organizations to provide for immediate physical needs of survivors.

- Carefully planned pre-allocation of necessary material- food stuffs, water, clothing, plywood, roofing shingles, etc. – to areas affected by disaster.(AMS)

Academia

- Emergency planning.
- Training and exercises (NHRAIC)

- Accurate forecasts and warnings.
- Little or no false alarms.
- Credibility of forecasters and media.
- Good communication.
- Good plans for response. (UCAR)

- Multiple methods of communications of events, forecasts, etc.
- Effective use of radio, television, etc.
- Close relationship between emergency management communities and NMHS's. (NRC)

US Private Sector

- A sense of trust in the authority providing the information would generate an effective response by the public. As for the Met Service's response to the situation, proper training, effective reliable tools and clear communication channels and skills are essential to an effective response. Understanding the implications of the information provided to the various emergency operations groups is also beneficial to an effective response.(WSI)

- Proper planning, sharing of resources and use of information technology to link, communicate, organize, train are necessary elements. Training is a very important component.
  (Essential Technologies, Inc)

- Early, timely notification of such events, or forecasts of such events, is crucial to preparation efforts. Such information needs to

be made available from a wide variety of services, media, Internet, etc.(DTN/Kavouras)

Other US Governmental Organizations

- Preexisting working arrangements, protocols, and agreements among federal, state, and local emergency managers and meteorological services.
- Repetition and practice. It's easier to deal with a regularly recurring hurricane threat than to deal with say, the Dust Bowl of the 1930's.
- Public awareness. (SNDR)

2a. Provide one or two examples of obstacles to effective <u>response</u> to the occurrence of tropical cyclones, floods, drought, or other natural disasters.

RA-I

- Lack of contingency measures to deal with adverse effects of these phenomena.
- Often inadequate preparedness contribute to a failure to cope with these disasters when they occur.(DMC Kenya)

- Lack of resources. (Tanzania)

-

RA-II

- On 5 May 1993, a severe dust storm occurred in northwestern China and caused serious losses of life and property. During this extreme event, meteorological offices and stations at various levels made forecasts on this event well in advance. However, we failed to distribute information timely due to poor local telecommunication conditions. This indicates that telecom facility is another difficulty we meet in disaster reduction. (CMA)

- Socio-economic constraints (India)

RA-III

- Faulty interpretation and inconsistent presentation, by the media, of any warnings and forecasts issued by the NMS's, that may be relevant to the safety of life and property.
- The lack of adequate or significant resources that would be needed if the emergency situation lasted longer than expected. (Argentina)

- High vulnerability. (Columbia)

- The difference on content which may occur in the information presented by the media and which can irritate the population (Venezuela)

RA-IV

- Weak coordination between the Meteorological Service and the National Emergency Commission.
- Lack of confidence in the meteorological forecasts by part of the emergency and rescue organizations. Costa Rica)

- Telecommunications fail or are interrupted. (Honduras).

- Collapse – prone mechanisms of public information because of deficiencies or outdated procedures.(El Salvador)

- Lack of visibility of NMHS's.
- Lack of partnerships or similar mechanisms to cooperatively disseminate warnings and forecasts.
- Lack of agreement on roles each participant will play in the process. (Guatemala)

- Poor telecommunications, which means preventing crucial information of NMHS's from reaching important users. (Netherlands Antilles)

Response is compromised when:

Warning messages do not clarify the threat, provide information for the receiver to personalize their risk, or outline appropriate response actions.

Members of the Hazards Community do not understand how to use NMHS products and services. (Some emergency managers do not know how to integrate hurricane strike probabilities into their decision making methodologies.)

Members of the Hazards Community are not aware of their responsibilities in the overall warning process.

- Some communities want the NWS to give the order for the sounding of siren systems.
- Some emergency managers want the NWS to make their evacuation decisions for them.

Critical information is not delivered in a consistent manner from multiple credible sources.

The Hazards Community does not function in a coordinated manner. (Multiple jurisdictions ordering evacuations without prior planning as to which routes to

use.)

The public is not educated as to:

- The hazards that can effect them.
- What actions they should take if a warning is received or a hazard is imminent.
- How they should prepare for hazards that could effect them. (US NWS)

The media, while a hugely effective communication tool, invariably has its own agenda that can also block the message. The media can 'spin' the story, and give it spurious importance, or downplay it unreasonably, according to its own needs. Occasionally the media demonstrate a certain degree of cynicism if the storm isn't severe enough, as if the weather service 'tricked' them. (AES)

- No testing of contingencies or assumptions
- No back-up systems
- No chain of command or general understanding amongst responders of how the pieces fit together. (AES)

- Economic resources.
- Training. (Nicaragua)

RA-V

- Lack communication to disseminate information/warning to remote areas. (Indonesia)

- Citizens do not have confidence in reliability of information. (N. Zealand)

RA-VI

- Division of competences, unclear responsibilities, complex command/information structures, bad training and lack of awareness. (DWD)

- Wrong forecasts.
- Ambiguities in the process of alarm.
- Misunderstanding between authorities. (Meteo France)

Media

- Met and government services should better utilize the tools available(radio and television) to get the official word out.(Univision)

- Some people do not fully understand how dramatically the magnitude of the impact of a hurricane varies due to hurricane intensity and track. If they were struck a glancing blow or even a direct hit by a weak hurricane they might feel that they can survive a direct hit by a strong one.(i.e., “We came through that 19xx hurricane with no problems so why evacuate for this one?)
- Sometimes the communication infrastructure is not there to ensure that the warnings reach the people, or warnings are too late for effective response.
- Inadequate transportation systems can handicap evacuation.
- Poverty conditions can limit the ability to take preventative measures and evacuate.(TWC)

- Oder-flooding –in the beginning of the flooding there was no communication from the news-people with the weather-department, therefore there were some publications about facts which were not correct.
- There was no scientific guidance from the National Weather Service concerning the prediction and the occasion in general. A report came out when the flood had gone already.(IABM)

Organizations

- Low credibility of disaster preparedness organizations due to various causes.
- Lack of adequate financing mechanisms for response activities. (IADB)

- Failure of information campaigns to convey vulnerability and response plans. (IDNDR)

- Lack of timely and accurate forecasting information and warnings
- Lack of credibility in the forecast.
- False alarms.
- Absence of (or weak) emergency response plans.
- Lack of adequate transportation networks and prepositioned disaster relief supplies. (ARC)

- Lack of coordinated efforts between specialized emergency management agencies and line agencies, and between line offices and specialized emergency management offices inside an agency (OAS)

- Lack of coordination between relief agencies and local law enforcement.

- Lack of backups for critical infrastructure, e.g., power, water supply, transport – damaged by disaster. (AMS)

Academia

- Lack of interest in training, planning and exercises.
- Inadequate planning. (NHRAIC)

- Poor forecasts, warnings or communication.
- Exaggeration of media and false alarms.
- Forecasters and/or media that have little credibility.
- "It can't happen to me" mentality on part of public. (UCAR)

- Lack of public education as to threat and consequences of inaction. (NRC*)*

US Private Sector

- Miscommunication between coordinating NMHS's or even lack of communication would limit the response to natural disasters. When the national borders become walls between NMHS's, the global community is at risk. (WSI)

- Not sharing information and resources in the most efficient and effective ways. (Essential Technologies, Inc.)

- Government policies which make it difficult or illegal to distribute information or forecasts not generated by the government. Policies that restrict access to, or charge money for, data and/or forecasts (warnings, etc).
- Information is the key to effective response, as well as preparation.(DTN/Kavouras)

Other US Governmental Organizations

- Ignorance about the true scale and nature of the disaster. For example, with respect to Hurricanes Andrew, Mitch, and Floyd, the response efforts were greatly compromised by underestimates of the threat/damage.
- Lack of preexisting agreements, protocols, etc., with regard to coordinating the response across federal, state, and local government authorities, and between the government, the private sector, and the public. (SNDR)

3. What might your organization contribute to national and international cooperation in preparation and response to tropical cyclones, floods, drought, or other natural disasters? Please note any unique capabilities, experiences, or expertise that your organization can provide.

RA-I

- The DMC has worked closely with the NMHS's in the region on the specific problems of droughts and floods with a view of providing effective prediction of the phenomena and provision of early warnings to the communities likely to suffer from the adverse consequences of these phenomena (DMC).

- Warnings of impending adverse weather.
- Surveillance of the weather in our area of responsibility. (Tanzania)

RA-II

- Chinese meteorological service is active in participation in the international scientific co-operation in atmospheric science bilaterally and multilaterally, such as SPECTRUM (Special Experiment Concerning Typhoon Recurvature and Unusual Movement) and GEWEX (Global Energy and Water Cycle Experiment). China is willing to further strengthen the cooperation in atmospheric science with the countries around the world and make its due contribution to the improvement of the forecast service on severe weather events like tropical cyclones, flooding and drought.(CMA)

- India has its own Geostationary satellite for meteorological remote sensing. India has a unique satellite based disaster warning dissemination system.
- Further, the Indian Meteorological Department is recognized as a Regional Specialized Meteorological Centre(RSMS) for providing cyclone advisories to all maritime states of the North Indian Ocean. India is an active member of the ESCAP Panel on Tropical cyclones over the Bay of Bengel and Arabian Sea. (India)

RA-III

- Our Regional Training Center can provide training in preparation and response to natural disasters, in their own language, to professional staff from other NMHS's.
- Our Regional Specialized Meteorological Center (RSMC) runs a regional model that can provide very useful operational information to other NMHS's. (Argentina)

- Experience in weather forecasting and climate prediction for tropical regions.
- Exchange of information (meteo, climate, hydro) in a international level.
- Sharing experiences on the preparation and response to extreme events. (Columbia)

- It is recommended to introduce a single official voice in order to avoid differences of opinion about the characteristics of the tropical cyclone and it will be an advantage to create national centers for hydro meteorological forecasts. (Venezuela)

RA-IV

- To give support to the Central American Countries with satellite imagery facilities (different channels).
- To issue climate forecasts on climate variability.
- To design a forum to discuss weather aspects in real time using Internet connections, in case of severe weather in Central America. (Costa Rica)

- Providing meteorological data in real-time. (Honduras).

- Part- taking in every international activity to upgrade cooperation and response systems providing expertise on local droughts and floods resulting from El Nino, tropical cyclones, etc. (El Salvador)

- We will facilitate establishing and maintaining weather observation and collection infrastructures(Guatemala)

- Nationally: assist in education of users of meteorological and hydrological information. This can be achieved through constant and regular contacts (workshops) at the national level with specific user groups (news media, utilities, tourism, disaster organizations, insurance, school teachers, etc.)
- Internationally: Good coordination at the regional level among NMHS's, such as the WMO-RAIV Hurricane Committee. (Netherlands Antilles*)*

The US NWS has been a leader in early warning systems and preparedness activities. Areas where contributions can be made are enumerated below.

<u>Hazard Analyses</u>:

- How to establish severe weather event climatologies.
- How to model storm surges and create inundation atlases.
- How to work with other agencies to create the equivalent of the ICCOH.
- How to conduct post storm data acquisition to better define hazardous

events.

Early Warning Systems:

- How to establish in-situ and remote sensing networks
- How to train volunteers as severe weather spotters.
- How to create a suite of critical information products to enhance decision making.
- How to establish dissemination systems to both deliver and make available critical information.
- How to establish partnerships to enhance service delivery.
- How to coordinate activities of the Hazards Community.
- How to create technical education materials for use by emergency managers and government officials.
- How to educate the public to respond to warnings and hazardous events.(US NWS)

The importance of broader scientific collaboration is self-evident. The critical mass required to conduct atmospheric and related research is often beyond the scope of any one service especially in consideration of the fragility of many NMHS's as they respond to budgetary pressures. The World Weather Research Programme (WWRP), the World Climate Research Programme (WCRP), the Programme on the Physics and Chemistry of Clouds and Weather Modification are but a few examples where the international community collaborates to resolve problems and test hypotheses.

NMHS should work closely with their counterparts in other countries to promote a culture of preparedness. After extreme weather, homes and businesses are sometimes put right back in harm's way. International evidence shows that the frequency and severity of extreme events will likely continue to increase in the future. We must participate fully in this national debate and help prove that mitigation investments are good public policy as they save lives, protect our environmental assets and save money that would otherwise be spent later on disaster recovery. There has been recent debate concerning the role of the IDNDR Secretariat at the end of the decade; perhaps NMHS's should be more engaged in this debate. (AES)

The Canadian Hurricane Centre in Halifax works closely with the US hurricane centre in Miami. The cooperation not only occurs during storms, we also collaborate on studies of aspects of hurricanes as they move northward and become extra-tropical (see; http://www.atl.ec.gc.ca/weather/hurricane/)

Preparation:

Communities around the world face different hazards, yet there are common elements that can be exploited by international cooperation. Together we can nurture a culture of prevention. More advanced NMHS may offer technological advice including network planning and seminars on what works and what does not to improve the capacity of

NMHSs to mitigate the effects of natural disasters, including establishment of early warning systems and disaster-resistant structures.

NMHS, regionally, could develop measures for the assessment, prediction, prevention and mitigation of natural disasters. This could be accomplished though technical assistance and technology transfer, demonstration projects, and education and training, tailored to specific disasters and locations, and to evaluate the effectiveness of those programs.

Response:
NMHSs who run global models could back-up affected countries programmes. This is managed during hurricanes where RSMC's assume such responsibilities.

Furthermore, together we could;

- Devise strategies for applying existing scientific and technical knowledge, taking into account differing geography as well as cultural and economic diversity;
- Foster scientific and engineering endeavors aimed at closing critical gaps in knowledge that will reduce the loss of life and property;
- Disseminate existing and new technical information related to measures for the assessment, prediction and mitigation of natural disasters. (AES)

- To share experience obtained during the occurrence of past natural disasters. (Nicaragua*)*

RA-V

- Continue to develop close ties with National Emergency Management bodies.
- Coordinate activities with those of other international bodies concerned with disaster mitigation. (Indonesia)

- Continue agreed contract for services for severe weather warnings, volcanic ash trajectories, etc. (N.Zealand)

- Malaysian Meteorological Service (MMS) has always given much emphasis to research relating to weather phenomena in the Malaysian region and has gained considerable physical insight into monsoonal as well as tropical phenomena, which include monsoons, depressions and tropical cyclones in the low latitudes, and El Nino/La Nina impact in Southeast Asia.

- The continuous effort in research has contributed progressively to the enhancement of the capability of the national meteorological service in the preparation and response to severe weather phenomena at a national level. For example, MMS prepares a special guidance booklet relating to ENSO

and northeast monsoon, and the projection for the year concerned, specifically directed to the National and State Disaster Management Committee Meetings.

- Internationally, Malaysian scientists present scientific information relating to the El Nino/La Nina impacts on Southeast Asia in international for a and contribute to the validation of the regional models as well as the improvement in the understanding of El Nino/La Nina in the regional scale.(MMS)

RA-VI

- Function Regional Specialized Meteorological Center for Europe, new numerical models with high resolution (non-hydrostatic Numerical Weather Prediction).
- NMS operates Wide Area Network (WAN) not only for NMS purpose but for other nationwide requirements.
- Cooperation within the German Committee for Disaster Preparedness(follow-up to the German IDNDR Committee)
- Cooperation and pooling of resources with (hydrological) flood forecasting centers. (DWD)

- Severe weather warning services for a large range of natural disasters, including a WMO responsibility for cyclones in Southwest Indian Ocean. (Meteo France)

- Tropical cyclones: Although not a WMO designated center for cyclone predictions, the global NWP model of UKMO has a good established reputation for successful forecasting of their movements. (UKMO)

Media

- Univision is the United States' 5th largest network, but it is widely seen on cable and satellite systems across Latin America. ClimaData has radio and television clients in the Dominican Republic, Puerto Rico, the Virgin Islands, and across the U.S.

  Millions can be reached through Univision and/or ClimaData broadcasts. Close cooperation between weather services and either the network or the private forecasting firm can lead to wide dissemination of their critical weather information. The best way to achieve this is to expand each country's web presence.) (Univision)

- The Weather Channel provides forecasts of severe and hazardous weather via cable television, radio and Internet throughout the United States, Latin America and other parts of the world. We have established a team of

experts with specialties in tropic storms, winter storms, and severe thunderstorms. We broadcast office NWS warnings and provide additional analysis and explanation of the weather factors behind them. We believe that the value-added information helps the public understand the nature of the hazard and thus, makes it more likely that they will take precautionary measures. We are pleased to work with governments and private organizations in programs to improve our customer emergency preparedness.(TWC).

- Can contribute with professional guidance, how to handle severe weather carefully also without having satisfying information; professional commentaries, explanations and adequate graphics. Work with the news-people to make them aware of the seriousness of weather-occasions. Can only recommend that a better information about warnings and the occasion itself by the met service is necessary, also a better communication with the met service.(IABM)

Organizations

- IADB finances technical cooperation to identify improvements in forecasting capabilities of its member countries.
- Provides loans for investment projects to improve these capabilities and to rehabilitate infrastructures.
- Provide technical cooperation and loans for capacity building and institutional strengthening. (IADB)

- Global Change Strategies Intl. Provides consulting services on risk management strategies, climate change, water management issues and related matters to governments and international and national corporation's.(Bruce)

- Over a century's worth of experience in helping people prepare for, cope with, and prevent disasters.
- A corps of paid and volunteer staff that responds to more than 60,000 incidents ranging from fires that affect single families to massive hurricanes that devastate entire regions.
- Expertise on the measures that are necessary to save lives, reduce injuries, and lessen property damage.
- Credibility with the American public.
- A highly respected Community Disaster Education program that is very effective at 1) raising the public's awareness of the hazards that threaten them and 2) informing or education the public of the actions they need to take to better protect themselves or their homes
- A strong commitment to do more to help make families and communities from the ravages of natural hazards.
- A vast array of partnerships with organizations at the local, state and national level. (ARC)

- Political and strategic action and technical forms to design, discuss and adopt international cooperation programs integrating specialized agencies (WMO) with governance, production and social sectors(public and private). (OAS)

- AMS organizes and supports scientific and technical meetings and workshops to further more effective partnerships.(AMS)

Academia

- Knowledge in the social sciences regarding hazards, warning systems and preparedness (NHRAIC)

- Involvement in education and training through COMET.
- Involvement in interdisciplinary research involving atmospheric and social scientists through ESIG.
- Research on better observational systems and numerical models for making better forecasts. (UCAR)

- The NRC has a natural disaster roundtable, which could be used to address the results of this workshop and recommend implementation strategies. (NRC)

US Private Sector

- WSI can provide COTS tools at affordable prices to assist the NMHS's in preparing and analyzing the vast quantities of information related to an event. Working more closely with NMHS's to solve their data management issues is a goal we would welcome.
- We also can provide a channel to the Media for communicating the NMHS-attributed information. As a service to our industry customers with mission critical operations, we can interpret the impact of an event on their business. This is a service that is beyond the scope of the public sector and is tailored to the individual customer's needs.(WSI)

- Twenty five years of experience supported by state of the art software used by the US Federal Emergency Management Agency, Army National Guard and agencies in 22 countries. (Essential Technologies,Inc.)

- We can provide several different means of communication, directly through satellite and Internet display systems, and indirectly through our customers in the media and commercial sectors.(DTN-Kavouras)

Other US Governmental Organizations

- The National Science Technology Committee Subcommittee on Natural Disaster Reduction (SNDR) could provide:
- A point of contact for U.S. (federal) participation in pre-event mitigation activities
- We bring nineteen federal agencies to the table for coordinating disaster reduction activities. (SNDR)